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CONTENTS

PEOPLE'S REPUBLIC OF CHINA

ABSTRACTS

SWEDISH FIRM SELLS LICENSE FOR SHIP SCREWS, GUIDANCE SYSTEM

Stockholm DAGENS NYHETER in Swedish 1 Sep 83 p 21

[Article by Kjell Lofberg]

[Text] Johnson-owned Nordstjernan AB's subsidiary KaMeWa of Kristinehamn defeated some stiff competition to win the most extensive licensing agreement to date between Sweden and China.

KaMeWa has sold licenses to the China Shipbuilding and Trading Company (CSTC) for the production of propellers, thrusters, and control and guidance systems.

The contract was drawn up last May, but was not published until now because it was only recently approved by the Chinese government.

In the short term, the licensing agreement will generate no significant funds for KaMeWa and Nordstjernan, but could provide considerable revenues in the future. It is a 10-year agreement. KaMeWa will receive compensation at the same rate the Chinese begin production on the licensed products.

"This probably is the largest contract ever signed between Sweden and China," said Hugo Wolff, sales engineer at KaMeWa. "At least this is what the Chinese told us."

China is just beginning to build up an enormous shipbuilding industry. Many developing countries have chosen shipbuilding as an initial sector of industrialization. This was the path chosen by Japan and South Korea. Now China will enter the competition, first to meet its own needs for river and coastal ships, then for exports.

For Nordstjernan and KaMeWa, this could mean the opening of a new market in Asia, which currently is the world's most expansive shipbuilding market. The licensing arrangement means that the Chinese themselves will manufacture the ships whose licenses were sold by KaMeWa.

At the same time, however, it is highly probable that part of the production will occur in Kristinehamn, since China probably has an insufficient ship building capacity. Thus, the licensing agreement could make it possible for

KaMeWa to produce various components.

KaMeWa is one of the world's leading companies in the area of propeller production. The company already has licensing arrangements with the United States and Japan.

KaMeWa refused to reveal how much money was involved. Millions of kronor probably are involved, however. KaMeWa representatives say, however, that the agreement could be extended after 10 years and that other licenses could be sold to China.

9336
CSO: 3650/281

NATIONWIDE COMPUTER USERS' INFORMATION RETRIEVAL SYSTEM

[Article by Sun Zhihui [1327 1807 2964], Zhu Yijian [2612 1837 0256] and Lang Yan [0781 7346]; other investigators who contributed to this work are Comrades Xie Hongyuan, Zhang Xiaotao, Zhang Hua and Chen Zhuwen]

[Text] I. Introduction

In order to facilitate the use of scientific methods in managing the computer users and the technical and financial data on different computers in this country, and to improve the quality and efficiency of management, it is essential to develop a nationwide computer users' information retrieval system with Chinese characters.

For this reason, the China Computer Technical Service Company joined force with the Nanjing Institute of Technology to undertake this task; they designed and implemented a practical Chinese-character information retrieval system with the following capabilities.

This system can store 41 pieces of technical data on every computer user and 35 pieces of technical data on all computer models used in the country (see Fig. 1). It has the capability of performing information retrieval, statistical analysis, data modification and deletion; the results can be displayed or printed in clear Chinese characters. For the user's convenience and to increase the user's confidence in using the system, all operations of the system are displayed on the screen in Chinese characters; also, diagnostic and editing capabilities are provided.

II. Data Model

The system contains two basic types of data: user data and computer model data. Because of the large data storage requirement, the constraint with the Sigma-10 microcomputer to store both system programs and user programs (including user data) on a single magnetic disc, and the difficulty in estimating storage size due to the variable record length (e.g., the computer model owned by each user can vary), the first priority in designing the data model for this system was to conserve storage space; increasing the system response speed was a secondary

consideration. For this reason, the system adopted a hierarchical data model, which has clearly defined paths for data transfer, and the concept of logical data base. The proposed data model is shown in Fig. 2.

In the hierarchical model of each data type, the entire logical structure is a tree composed of a number of different records and chains. The records are the nodes of the tree; each record in turn contains a number of data items. The order of the data in each record is indicated by its physical location in the diagram; the chains represent the relation between the records.

Some data items (e.g., peripheral devices, application software) are used in two different files. In order to reduce data redundancy, the concept of logical data base in the hierarchical data model is used to maintain a hierarchical structure logically and to share the data items physically. This approach not only provides a link between the two systems, it also greatly reduces data redundancy.

III. File Systems

The following factors were considered in the design of this system: (1) effective implementation of the hierarchical model; (2) efficient use of the magnetic disc storage in the form of variable-length logical records; (3) increase in the speed of retrieval and in the speed of conversion of Chinese character codes. During system initialization, different types of file structures were established: data files, index files, and Chinese character files (CHIN).

1. Data File. A computer model data record contains the complete information about a particular computer model; a user data record contains the complete information about the computers owned by a particular user. Because the latter is subject to frequent additions and deletions, its format has a chain table structure. The variable items in the two data files are linked to the index file using chains. The record formats of the user data file (DATA) and the machine model data file (KDATA) in the retrieval system are shown in Figs. 3(a) and 3(b), respectively.

In order to effectively allocate the storage space required by the data files and release the space back to the system after a record has been deleted, two storage pools are established in the system (storage pools 1 and 2). During system initialization, the storage pools are in a configuration as shown in Fig. 4.

The configurations of the storage pools and the chain table file when fetching a record space from the storage pool or returning a record space to the storage pool are shown in Figs 5(a) and 5(b), respectively.

When the storage pool on the magnetic disc is depleted, the system alerts the user to change the diskette and to initialize the new diskette. In this manner, the system is not constrained by the actual amount of data; as a result, the number of records in the data file can be greatly increased.

A sequential search technique is used because the items in the index file are the Chinese character address codes, which cannot be easily arranged in order.

The structures and search techniques of the individual index files in this system are basically the same, hence only the user index file "MAIN**" will be used as an example for illustration. (See Fig. 6)

6. Chinese Character File (CHIN). In the Sigma-10 microcomputer, the display and printing of Chinese characters are accomplished by a three-stage conversion process using the Chinese character interpretive language. (See Fig. 7)

In order to reduce the conversion time and storage space for Chinese character codes, a Chinese character file (CHIN) is established to store the address codes of commonly used Chinese characters during a man-machine dialogue. When Chinese characters are used for inquiries and for user messages during system operation, the required Chinese character address codes are fetched from CHIN

[...] used in the corresponding display/print operation. By storing only the Chinese character addresses, it is possible to reduce the storage requirement by one third, and at the same time eliminate the level 1 conversion time for converting a 6-digit Chinese character code to a 2-byte address code (during display/print).

The above description shows that space utilization is a primary consideration in establishing the data model for the retrieval system. An analysis of the system response speed is presented below. Because the user data file contains the largest amount of data during system operation, the system response speed is the slowest when retrieving user data. Therefore, by analyzing the response speed in retrieving user data files, one can determine whether the data model design and the corresponding retrieval technique are conceptually sound and feasible in practice.

The system response time is primarily determined by the number of visits to the magnetic disc; also, due to the limited core storage of the Sigma-10 microcomputer, it is not possible to transfer an entire file from the magnetic disc to the core memory, only a record at a time can be transferred. Therefore, under this worst condition, the system response time T for retrieving the operating status of all the computers of a particular user is:

$$T = (n + m (a+b+c+d))^* t$$

where n is the number of users in the province

m is the number of computer models belonging to this user

a, b, c, d are respectively the number of peripheral devices, the number of terminals, the number of system software, and the number of application software of a particular computer

t is the time required for each visit to the magnetic disc (t is primarily determined by the time required for moving the tsk magnetic arm and the input speed)

Under most conditions the values of a, b, c, d are quite small. Actual test results show that the system response time completely meets the user requirement, and the speed of retrieval is satisfactory.

IV. System Implementation

This retrieval system can perform the typical functions of other conventional retrieval systems, i.e., creating, retrieving, editing, deleting, and displaying/printing In addition, it has the capability of calculating statistics, initialization, and printing the record numbers of data files and index files. For considerations of readability and maintainability in the design and implementation of the system, these functions are divided into corresponding functional modules which are stored in the form of files on the magnetic disc. During system operation, a functional module can be fetched from the magnetic disc according to the user's selection.

Step 4: release ... ...
... ... all ... ...

Step 5: retrieval ... ...
... (B), ..., ...
... ...
... ...

Step 6: retrieval ... ...
... ... retrieving ... ...
... ...
... .

Step 7: print the record number of data ... ...
..., are finished ... the record number. ... ...
... ... print the record number ... ...
... ... increase ... speed of retrieval.

Step 8: initializing (...... file); the data ... ...
... record, various file structures must be ... ...
..., and two large storage ... must be establish ...

5. Concluding Remark.

... ... design, testing, and ... of this ... ...
... establishing a practical database management ... ...
... microcomputer. But ... ... limited ... ...
... particularly the small storage space and ... ...
... implement ... conventional high-power data management ... ...
... overcome the difficulty of insufficient internal storage, ...
... this system are divided into 4 functional modules which ... ...
... ... relieve the requirement on internal storage, ...
... ... by ... data ... of the hierarchical data ... ...
... data redundancy, so that the merit of ... ...
... this retrieval criteria is ... ...
... possible to arrange the program structure ... ...

... ...

... ...

... In summary, it can be concluded that many present ...

... ... control system may be realizable or practically feasible.

Fig. 1(a). Computer User Data

1. [...]
2. User name
3. Address
4. Computer model
5. [...] unit
6. Manufacturer [...] ...
7. [...] name
8. Factory name
9. Date of installation
   (year, month)
10. Date of start operation
    (year, month)
11. Internal storage
12. Medium
13. Capacity
14. Unit
15. External storage
16. Magnetic disc
17. Magnetic tape
18. Magnetic drum

19. Buffer [...]
20. Machine efficiency (hour/day)
21. Average down time (hours)
22. Failure type
23. Main application
24. Economic efficiency
25. Operational efficiency
26. Maintenance personnel
27. Number of hardware personnel
28. Number of software personnel
29. Person in charge
30. Peripheral devices
31. Name
32. Specification
33. Manufacturer
34. Terminals
35. Distance
36. Application software
37. Application
38. System software

Fig. 1(b)   Computer Performance Data

Key:

1.	Model name	
2.	Manufacturer	
3.	Type	
4.	Internal storage	
5.	Medium	
6.	Capacity	
7.	Basic	
8.	Maximum	
9.	External storage capacity	
10.	Magnetic disc	
11.	Magnetic tape	
12.	Magnetic drum	
13.	Buffer	
14.	Unit	
15.	Interface	
16.	Number of serial lines	
17.	Number of parallel lines	
18.	Maximum number	
19.	Date of first batch produced (year, month)	
20.	Number of units produced	
21.	Most suitable application	
22.	Status of development	
23.	Current status	
24.	Word length	
25.	Instruction cycle	
26.	Primary frequency	
27.	Equipment	
28.	Speed of floating point addition	
29.	Speed of floating point multiplication	
30.	Peripheral device	
31.	Number of units	
32.	Name	
33.	Specification	
34.	Manufacturer	
35.	With or without multiply/divide hardware	
36.	Application software	
37.	Application	
38.	System software	

Fig. 2 Data Model

Key:

1. User data file system
2. Computer model data file system
3. Province
4. User
5. Machine type
6. Computer model-user technical data
7. Computer model
8. Computer model-manufacturer technical data
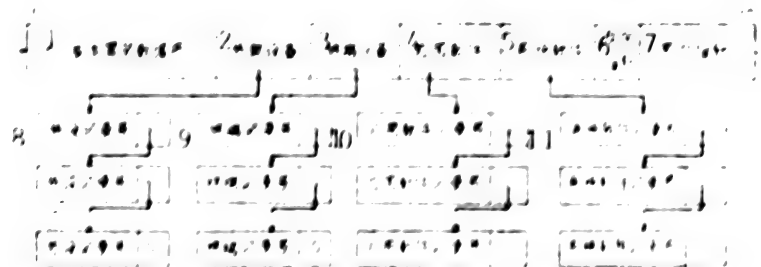
(a) DATA File Data Record
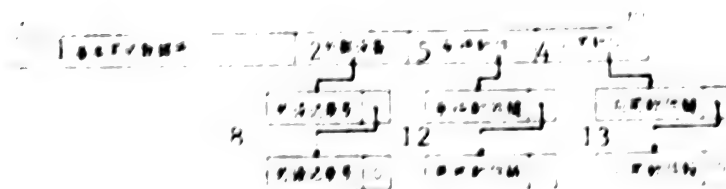
(b) KDATA File Data Record

Fig. 3

Key:

1. Fixed basic data item
2. Peripheral devices
3. Terminals
4. Application software
5. System software
6. Reverse pointer
7. User pointer
8. Peripheral device record number
9. Terminal record number
10. Application software record number
11. System software record number
12. System software chain
13. Application software chain

10
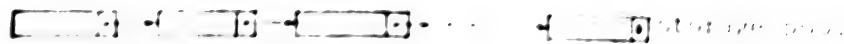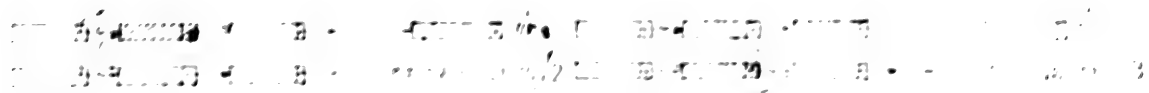
Fig. 4   Storage Pool

Fig. 5

(a) Fetching a Record Space   (b) Returning a Record Space
    from the Storage Pool   to the Storage pool

Key:
1. Storage pool
2. Chain table file for fetching a record space
3. Chain table file for returning a record space
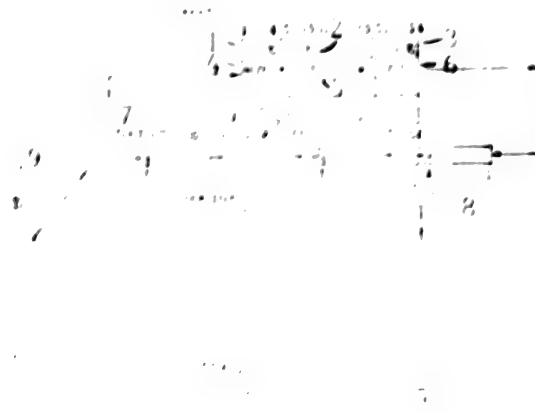
Fig. 6   Index File MAIN**

Key:
1. Number of users   5. Address
2. Number of computers   6. Pointer
3. Number of records   7. DATA user data file record
4. User name   8. Reverse pointer
                             9. Index file for each province
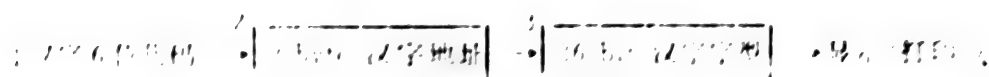
Fig. 7 Conversion of Chinese Character Codes

Key:
1. 6-digit Chinese character code   3. 36-bit Chinese word
2. 2-byte Chinese character address   4. display/print
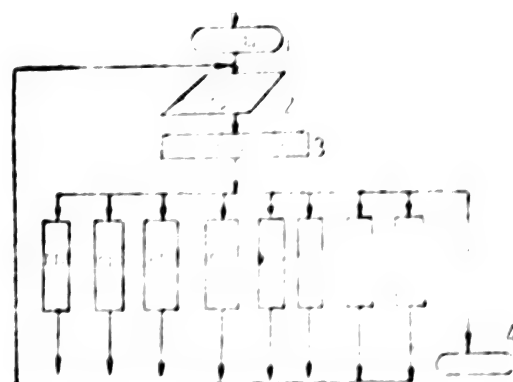
Fig. 8 Functional Modules of the Retrieval System

Key:
1. Start   3. User selected function
2. System Chinese character prompt   4. End

3012
CSO: 4008/160

CHARACTERISTICS OF NEW POLYBUTADIENE DESCRIBED

[Article by Si Shaoru [0242 1421 0320] and Tang Xueming [0781 1331 2494],
Changchun Institute of Applied Chemistry, Chinese Academy of Sciences: "A
New Polybutadiene"]

[Excerpts] Since 1,2-polybutadiene has many excellent characteristics, it is
finding increasingly broad applications in such fields as rubber, plastics,
paints, adhesives and the like; as a result, research on it throughout the
world has been extremely active in recent years.[1-4]

A molybdenum catalyst system can be used to synthesize 1,2-polybutadiene, but
earlier molybdenum catalyst systems had rather low activity, and it was neces-
sary to use toluene, cyclohexane and the like as solvents. Using hydrogenated
gasoline as a solvent, we systematically investigated the catalytic effects of
the molybdenum system on the formation of 1,2-polybutadiene. A new, highly
active molybdenum catalyst system was found. Its activity is close to that of
Ni, Ti and Co systems and yields polymers with certain unique characteristics.

I. Polymer Synthesis

1. The Catalyst. It consisted of molybdenum alkoxytetrachloride ($MoCl_4OR$)
and a suitable aluminum alkyl. The catalytic activity depends on the nature
of the substituent R. It increases with increasing size of R. When R in the
alkyl group is less than 7 carbon, the catalyst does not dissolve in the gaso-
line solvent and its activity is very low or nonexistent.

The catalytic activity is also affected by the distribution ratio of the main
and auxiliary catalysts. With the quantity of $MoCl_4OC_8H_{17}$ fixed, the activity
shows a peak value as the Al/Mo ratio is varied. The position of the peak
shifts toward higher Al/Mo molar ratios as the quantity of $MoCl_4OC_8H_{17}$ used
is decreased. This makes it clear that a certain aluminum alkyl concentration
must be maintained in the polymerization systems to assure full formation of
active centers.

The catalytic activity is also highly dependent on the polymerization tempera-
ture, i.e., it increases with higher polymerization temperature. If the

Mo.../Co... ... ... is used for polymerization at less than 70°C, and when the Mo/Bd ratio of the catalysts (the molar ratio of main catalyst to butadiene) is ... ... to 5 x 10⁻, the conversion rate can reach 80 percent or more, but if the Mo/Bd ratio is ... ... to 10⁻², it still can catalyze polymerization of the butadiene.

2. Molecular-weight distributions of the polybutadiene produced by the system are affected by the amounts of the main catalyst used. As the amount of the main catalyst is decreased, the molecular weight of the polymer increases ... ...; when the Mo/Bd ratio is 2.4 x 10⁻⁴, the weight average molecular weight exceeds 1 million. When the amount of catalyst used is relatively large, the polymer does not gel; but when the amount of catalyst is decreased to a Mo/Bd ratio on the order of 10⁻⁵, not only is the molecular weight of the polymer rather high, but also gels at times, resulting in difficulties for processing. Therefore it is necessary to regulate the molecular weight of the polymer. A rather effective regulation method is the addition of certain polar additives during polymerization; these additives affect the molecular weight. For example, allyl halides have a considerable regulating effect on the molecular weight; at the same time, when it is used within a certain range, the activity is not decreased and may actually increase. Amongst the allyl halides, allyl iodide produces rather good results. When the Mo/Bd ratio is 8 x 10⁻⁴ and the polymerization temperature is 50°C, an (allyl iodide)/Mo ratio exceeding 10 can result in an average polymer molecular weight of less than 200,000.

The molecular-weight distribution is rather narrow with this system; with polymerization between 30° to 70°C, the polydispersity index is 1.5 to 2.0. The polymerization temperature and certain polar additives may be used to make the polydispersity greater. In particular, allyl iodide can produce this effect.

3. The distribution of chain structure in the polymer. We used infrared spectroscopy, ^{13}C-NMR, pyrolysis, etc. to study the chain structure produced by the MoCl₅/OR system. We found that the polymer always consists of more than 85 percent of 1,2-chain links. As for the 1,4-chain links, trans-forms were greater than cis-forms. The proportion of 1,2-chain links in the polymer can also be regulated by certain additives. Allyl halides can increase the formation of 1,2-chain links. The use of allyl iodide leads up to the production of 92 percent of 1,2-substitutes of butadiene.

Such additives as allyl iodide are also able to regulate the spatial structure of the polymer chains. Fig. 7 [not reproduced] is a ^{13}C-NMR spectrum for CH₂ = groups in the polymer. The spectrum shows clearly that as the amount of allyl iodide is increased, the characteristic curve for isotactic 1,2-chain links shrinks, while that of syndiotactic 1,2-chain links expands. Table 2 shows the relative amounts of the different types of 1,2-chain links obtained with ^{13}C-NMR; the data make it clear that allyl iodide can increase the stereoregularity of the polymer chains.

Table 2. Relative Content of Different Types of 1,2-Chain Links in Polymer

Allyl Iodide/Mo (molar ratio)	0	0.3	1	4	8	10
Isotactic (percent)	48	36	28	25	22	22
Syndiotactic (percent)	13	22	29	3.	34	34
Atactic (percent)	39	42	43	44	44	4.

Based on the results of the NMR measurements, the amount of 1,4-chain links is very small; in essence they are only isolated elements distributed among the various isomeric 1,2-chain links. The sequential arrangement of the various 1,2-chain links is almost atactic, but as the amount of allyl iodide used is increased, the regularity of the chains increases. Table 3 shows the number-average and weight-average sequence lengths of isotactic and syndiotactic 1,2-chain links.

Table 3. Average Sequence Length of Isotactic and Syndiotactic 1,2-Chain Links

Allyl Iodide/Mo (molar ratio)	0	0.3	1	4	8	10
$\langle M_I \rangle_n$	3.2	2.5	2..	2.0	1.9	1.8
$\langle M_s \rangle_n$	1.4	1.7	1.9	2.0	2.1	2.2
$\langle M_I \rangle_w$	5.5	4.0	3.3	3.0	2.8	2.6
$\langle M_s \rangle_w$	1.9	2.3	2.8	3.0	3.2	3.4

Note: $\langle M_I \rangle$ and $\langle M_s \rangle$ indicate average sequence lengths of isotactic and syndiotactic structures respectively; subscripts n and W indicate the values of number-averaged and weight-averaged.

II. Physical and Mechanical Properties of the Polymers

The properties of the polymers are determined by their structure. The structural characteristics of the polybutadiene produced by the $MoCl_5OP$ system results in certain unique physical and mechanical properties. As Table 4 shows, the glass temperature of the polymer is rather high and increases with increasing amounts of allyl iodide. This characteristic is related to an increase in the proportion of 1,2-chain links in the polymer and also to an increased regularity of chain structure.

Table 4. Polymer Glass Temperature Tg, °C

Determination method	Allyl Iodide/Mo						
	0	1	2	3	4	8	10
Linear expansion	-27	-17	-16	-16	-16	-13	-12
DSC	-15	-10	- 8	- 9	--	-13	- 8

. . . . the results of X-ray diffraction analysis, under a constant-
. . . . static condition and when the allyl iodide/Mo molar ratio is less
. . . . , the polymers are all amorphous. However, under stress the situation
. . . . Fig. 8 shows . . stress-strain curves for the polymers obtained
. . . . amounts of allyl iodide; when the curves for allyl iodide/Mo
. . . . and 4 exceed the yield strength, the slopes first gradually,
. . . . gradually rise, indicating that following stress fading a new
. . . . developed. There can be two reasons for the development of this
. . stress. One is that the polymers may have high molecular weight, gelling
. . . . when stretched. The other is that crystals may form after
. . . . In the work reported here the first factor is not present be-
. . . . meric characteristic viscosity factors [·] are all less than 4
when stretched as new stresses formed. The smaller the value of [·], the
stronger the new stresses; but when [·] is greater than 4, stretching does
. . . . . . in new stresses (see Table 5): after stretching, the polymers show
. . . . . . or cross linking. Therefore, the new stress can only be the re-
. . . . lization due to stretching. An absence of crystals in the sta-
. . . . , followed by crystal formation on stretching, is the stress-strain
. . . . . . typical of natural rubbers, but is uncommon in synthetic poly-
. . . . When the allyl iodide/Mo molar ratio is 10, the polymer shows no stress
. . . . to breakage, but there is some crystallization in the static state
. . . . temperature; the melting point of the crystals is 62°C.
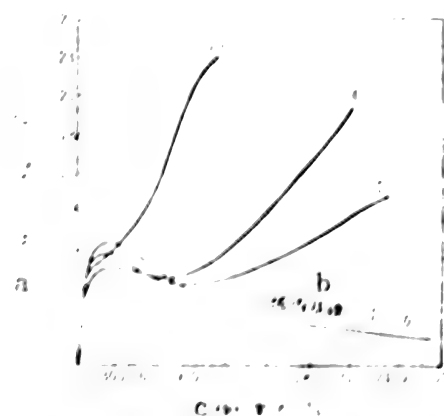
Fig. 8.   Stress-Strain Diagram for Polymer

Key:
a. Stress   b. Allyl iodide/Mo=0   c. Elongation

It is evident from Table 5 that the mechanical strength and elongation for
this polymer resin exceed those of natural resins. These high values also
result from the structural characteristics of the polymer. It can be seen
from Table 2 that the regular 1,2-chain segments (isotactic or syndiotactic
structures) account for 50 to 60 percent of the total. When these steric-
ally regular chain segments are stretched they can produce microcrystalline
regions which serve as cross-linking points, so that the polymer exhibits
great strength. In addition, the polymers include 40 percent atactic

Table 5. Some Fundamental Physical and Mechanical Characteristics of the Polymer

(mol) a	σ, MPa	σ, b kg·cm²	c kg·cm²	d %	e p	f (1—?)
?	4.34	8.25	0	2900	0.19	0.34
1.2	3.10	8.13	0	~2900	0.19	0.35
2	4.03	8.34	13.33	~2900	0.25	0.14
?	3.23	7.96	21.17	~2900	0.31	0.04
?	2.43	6.53	22.04	2680	0.62	0.72
.3	1.35	8.34	23.27	1700	0.64	0.62
g 天然树脂*	6.93	5.30	18.90	405		
	3.54	3.40	3.30	760		

*Data from stress-strain curves of reference 5.

Key: a. Allyl iodide/Mo (molar ratio)   e. Plasticity
      b. Yield strength   f. Elastic recovery
      c. Breaking strength   g. Natural resins*
      d. Breaking stress

1,2-chain links and a small number of 1,4-chain links so that many of the polymers cannot crystallize in the static condition, but when stretched, the internal stress concentration of the atactic chain sections is low, so that the polymers have a very high elongation characteristic.

III. Conclusions

The catalyst system consisting of $MoCl_3OR$ and a suitable aluminum alkyl has a very high catalytic activity for the polymerization of butadiene; the molecular weight distribution of the resultant polymer is rather narrow, and the molecular weight of the polymer and the steric chain structure can be regulated by allyl halides. The resultant polymers have very high mechanical strength and breaking stress, and they show some promises of being a new type of polybutadiene with a variety of uses.

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DEVELOPMENT OF NATION'S RARE EARTH INDUSTRY VIEWED

[Article by Zhou Zhuandian [0719 0278 0368], vice-minister of the Ministry of Metallurgical Industry, chairman of the Council of the Chinese Rare Earth Society: "Giving Full Development to China's Rare Earth Industry for the Four Modernizations"]

[Text] The initial issue of JOURNAL OF THE CHINESE RARE EARTH SOCIETY has been published. The publication of this journal will expedite the development of scientific technology, production and applications of rare earths. It will also promote the academic exchange at home and abroad and give impetus to better understanding and cooperation of the rare earth scientists and technologists in and outside China.

Rare earths are important materials for national economy and defense. China's rare earth resources are richly endowed by nature. The industrial reserves and prospective reserves of rare earths in China are respectively five times and three times that of other countries in the world. Rare earths occur in eighteen provinces and regions in China, mainly in Inner Mongolia, Jiangxi, Hunan and Guangdong provinces, of which Inner Mongolia occupies the first position. In China, rare earths are more plentiful than copper, lead, zinc and tin. There is significant value in comprehensive utilization and multi-purpose use of rare earths in China because they are found in association with many other metal-bearing minerals and are of high grade. In China, there exist not only bastinasite, monazite and mixed rare earth ore, mainly containing lanthanum and cerium, but xenotime, mainly containing yttrium. For instance, in Baiyun-ebo ore body near Baotou, rare earths are found in association with iron, niobium, manganese, phosphorus, fluorine, etc., and the europium oxide, samarium oxide contents in rare earth ore are double those of Mountain Pass' in the United States. The ion-adsorpion type rare earths in Jiangxi Province have great economic value because they are rich in yttrium, samarium, europium, terbium, etc., and easy to exploit.

The Communist Party and government of China have been paying great attention to the development of rare earth industry, especially for the comprehensive utilization of Baotou resources. Consequently, Baotou now can produce concentrate, containing more than 60 percent rare earth oxides by new ore dressing technology for associated oxidized ore, and the grade of rare earth content is

in reasing with low cost reduction of production cost. Thus, Baotou is now the raw material base for the development of rare earth industry in China. For the treatment of rare earth concentrates, high temperature chlorination, high temperature sulphatization roasting, and alkali-decomposition have been success-fully conducted enabling the rare earth production technology to reach advanced level. Due to the improvement of the production technology, misch metal from chloride, individual rare earth oxides and individual rare earth metals are becoming commercially available. Having Chinese characteristics, the methods for preparing rare earth ferrosilicon alloys have been achieved with reduction of production cost and the products are highly competitive. In our country, there are about ten plants which produce 200 kinds of rare earth materials, including intermediate products, compounds and metals. Their capacity of production ranks second in the world.

The abundant rare earth resources and the results obtained in scientific research work in China provided a material base and created favourable conditions both for domestic applications and export of rare earth materials. Rare earths have now been widely used in China in metallurgical industry, machinery industry, petrochemical industry, chemical engineering, light industry, glass and ceramic industry, electronics, military engineering, agriculture, etc. For a long time, China has been producing rare earth nodular graphite cast iron and has developed practical technology. For example, the yttrium base nodulizer which is capable of keeping nodulizing from degradation has already been used in special cast. In recent years, rare earth vermicular graphite cast iron has been developed and obtained tangible results in making steel ingot molds. By improvement of the addition of rare earths in steel there arose a big increase of consumption of rare earths in steel in China. The addition of rare earths in nonferrous metals, especially in aluminum, magnesium, and copper obtained good results. With the addition of rare earths, aluminum cable produced in Guangdong Province has successfully withstood the severe tests of twelfth grade tornado. In addi-tion, there is a considerable production capacity of rare earth molecular sieve zeolite cracking catalysts in China. Rare earth catalyst for methanation has been used in our big synthetic ammonia plants.

Other miscellaneous uses of rare earths with striving results in China are: plastics, dyeing of knitting wool, polishing powder for glass, glass decolor-izing, glaze, etc. Formerly, arsenic was used for glass decolorizing, which was very expensive and brought environmental pollution. We now use rare earths as a substitute for it. In recent years, rare earths in China are used in advanced technological applications. These uses include, rare earth-cobalt permanent magnets for microwave devices, miniature motor, earphone, microphone and physiotherapeutic apparatus, phosphors for cathode ray tubes, color television (especially of red color), fluorescent lighting and X-ray inten... screens, etc. Besides, the use of rare earths in agronomy, pedology, toxi-cology, environmental science and microanalysis have been investigated and obtained certain results.

With the improvement of industrial technology, upgrading of the product quality, reduction of the production cost, China's rare earth products are gradually entering the international market in increasing quantity and species. With the

In place of the export of rare earth chlorides, we have augmented the export of rare earth oxides, rare earth fluorides, rare earth metals, alloys, concentrates and polishing powders as well.

China's rare earth industry has been established and developed on the basis of China's own scientific research works. Since its foundation in 1979, the Chinese Rare Earth Society has organized its members' activities in research and development, production and applications of rare earths. This society now has 2,000 members, including scientists, professors, engineers and manager staff. Through the activities of its twelve specific academic sub-commissions and local branches, The Chinese Rare Earth Society has been holding academic symposia, exchanging results of investigations, discussing the outlook of rare earths, at the same time, developing international contacts. In September 1983, the Seventh International Workshop on Rare Earth-Cobalt Permanent Magnets and Their Applications will be held in Beijing. We are waiting ardently for the holding of this conference and expressing our welcome to all foreign counterparts through this issue. We are looking forward to our cooperation, including technical exchange, coresearch, coinvestment, foreign trade, import of advanced equipment and technology.

The Sixth 5-Year Plan, approved by the Fifth National People's Congress of China has defined the investigation of the comprehensive utilization of the three big mines (Jinchuan, Panzhihua and Baotou) as key research projects and high priority has been given to rare earth production. This society will require all members to do their best to the fulfillment of all these goals.

The JOURNAL OF THE CHINESE RARE EARTH SOCIETY will continuously expand its influence on and make contributions to the rare earth undertaking in our country.

APPLIED SCIENCES

PROGRESS IN RESEARCH ON RARE EARTH CHEMISTRY NOTED

[Article by Ni Jiazuan (Nee Jiatzan) [0242 0857 4957], Changchun Institute of
Applied Chemistry, Academia Sinica: "Progress of Researches on Rare Earth
Chemistry in China"]

[Summary] China is rich in rare earth resources. The rare earth chemistry and
industry was founded under this favorable condition.

The development of rare earth chemistry is closely related to the growth of
the rare earth industry. In the fifties the fractional crystallization,
oxidation-reduction and ion-exchange processes for rare earths were studied
to meet the need of separation processes. Meanwhile different methods for
determining individual rare earth in the concentrate and mineral and impurities
in pure rare earth oxides and metals were successfully developed. Further
development of separation processes led to a thorough investigation on extrac-
tion and coordination chemistry of rare earths in the sixties. As the
separation process is improved and the extractive metallurgy attains to ad-
vanced level, solid state chemistry and material science of rare earth have
rapidly developed.

The main progress of the following areas of rare earth chemistry in China
is briefly summarized as follows: 1. separation chemistry; 2. solid state
chemistry; 3. coordination chemistry; 4. fused salt chemistry; 5. analytical
chemistry; and 6. quantum chemistry and spectroscopic properties of rare earths.

CSO: 4010/92

YIDOYU-1:   COMPUTER SYSTEM FOR OPTIMAL WING DESIGN

[Article by Yeh Kejia [5509 0344 1367], Lin Menghe [2651 1125 7729] and
Wang Menejue [2733 1125 3778]]

[Text] YIDOYU-1 is an application software developed by the Chinese
Aeronautics Research Institute to perform optimal design calculations for
large, general structures. It can be used to carry out optimal design of
airplane wing structures under multiple constraint conditions.

YIDOYU-1 is a program system developed on the Ximengzi 7760 computer; it con-
tains more than 40,000 lines of FORTRAN statements. The development work
began in June 1979 and was completed in October 1982; it was certified and
accepted by the Ministry of Aeronautical Industry in November of the same year.

The development of a large program which is practical and efficient in perform-
ing optimal design of wing structures is urgently needed by the airplane design
community. With ever-increasing airplane performance, the analysis and
synthesis of wing design are becoming more complicated. They must consider not
only static strength requirements but also requirements of aeroelasticity; how-
ever, it is a difficult task to satisfy both requirements simultaneously. To
perform separate analyses would require large amounts of labor and computational
time; therefore, it is desirable to have an optimal design tool which can
simultaneously take into account multiple constraint conditions (static
strength, displacement, static and dynamic aeroelastic constraints) in order
to improve the quality and increase the speed of design.

The YIDOYU-1 is a program system developed to meet the above requirements. Its
main features are summarized below: 1) It uses nonlinear mathematical pro-
gramming techniques to treat optimal wing design problems with multiple con-
straint conditions; it can also accommodate expanded constraint types according
to input requirements. 2) It can be used to design wing structures with control
surfaces and with attached fuselage sections. 3) Practical methods of stability
calculations are introduced through allowable stresses for redesign. 4) It
has good presolution and postsolution analysis capability. 5) It contains

user-oriented special language. 6) It uses analytical methods to compute various response coefficients and relies on many approximation techniques for the optimization model to increase the efficiency of optimal design.

Design Concept and Technical Approach

Special attention was given to the following criteria in the development of YIDYU-1.

1. High efficiency. The following technical approaches were taken to increase the computational efficiency of the system: introducing approximation concepts and techniques, and using analytical methods to derive coefficients, in order to reduce the number of complete structural analyses as well as the number of coefficient computations and computational complexity; using a structure of multiple main programs to reduce the number of operational pages and to facilitate parallel processing; using dynamically allocated common blocks with dynamic protection regions in order to fully utilize virtual storage and reduce the number of accesses of disc files.

2. User-oriented and user-friendly design. The system uses an automatic data generation module to avoid large amounts of manual labor in filling out data sheets; the system can produce report-quality printouts and graphic outputs, which greatly reduce the amount of work required to process the results; the system has prestored data files for commonly used elements, materials, and typical strength characteristics curves which are available as user options; the system also provides a user-oriented special language and modular programming structure, so that the user can organize and perform analyses and optimal design according to specific needs.

3. Generality. The system can perform optimal wing design not only under multiple constraint conditions but also under each individual constraints; it can also perform various structural analyses. The system uses a stage-wise program organization and has independent modular structure; in addition, it provides preassigned input functions so that a user can expand or alter the system capability according to his needs.

System Capabilities

The YIDYU-1 has the following capabilities:

1. It can perform optimal structural design under full stress conditions.

2. It can perform optimal design while satisfying completely or partially the following constraint conditions (using the method of mathematical programming): stress, displacement, vibration, flutter, various static aeroelastic constraints, and minimum dimension constraint.

3. It can perform one or more of the following tasks in structural analysis: calculation of flexibility influence coefficients, analysis of resonance characteristics, analysis of flutter characteristics, and analysis of static aeroelasticity.

4. The system can perform optimal designs of wing structures with the following limitations: finite element model with less than 3,000 degrees of freedom; less than 20 external loads; dynamic model with less than 200 degrees of freedom; flutter analysis with less than 20 flutter mode coordinates; nonstationary aerodynamics with less than 20 condensed frequencies; less than 100 design variables (including cross sectional parameters and matching weight variables).

Structural Model and Data Generation

The method of variable coupling has been used in developing the structural model to reduce the number of design variables. To perform structural analysis using the method of finite elements requires a large number of elements and design variables, which are difficult to handle mathematically and are unnecessary from the engineering point of view. Therefore, it is desirable to use a method where each design variable is related to a set of elements, so that hundreds of elements can be represented by just tens of design variables. Such an engineering treatment is called variable coupling.

In analyzing the dynamic characteristics of structures, the system must first reduce the high order state model to a dynamic model with less than 200 degrees of freedom by using the method of flexibility influence coefficient.

To facilitate structural modeling, various types of finite element models are used, including conventional structural elements, indexed elements, generalized elements, and mass elements. There are nine different structural elements in the system.

To perform optimal redesign under stress constraints, the system calculates the allowable stresses based on stability characteristics of the structure, and also considers the characteristics under supercritical conditions due to bending. The allowable stresses under supercritical conditions are calculated using semiempirical methods given in the stability handbook with corrections for plasticity.

The system contains a data generation module and provides a special language for data generation; the special language allows the user to automatically generate preliminary data for analysis and design by giving a simple description of the structure. The data generation module has 10 important functions.

The system has a data base which contains characteristics data of commonly used materials, and a subroutine which computes the nondimensional curves of allowable stresses based on given material characteristics. The user can also incorporate new material data according to his particular needs.

Structural Analysis

The system uses the finite element method in performing the analysis of structures. Because a number of repeated static analyses are required during the optimal design process, special efforts are made to preserve the intermediate results which do not vary with the design. After certain arrangement of the node points, a combined rigidity matrix is obtained and then processed using the highly efficient Gauss decomposition method; the decomposed rigidity matrix is stored for later use. To minimize computation, the system can be directed to analyze only certain key components. On the basis of experience, the designer selects a portion of the structure as key elements to participate in the optimal design under stress constraints. In effect, the structure is divided into several blocks according to the design requirement; then a representative key component is selected from each block to participate in the redesign, where the allowable stress for the component is calculated using the same method as for the design unit under consideration. This approach ensures the practicality of the system.

To determine characteristic analyses of the structural dynamics, the system uses the method of automatic matrix reduction to solve the vibration equation and uses the QR method to determine the complete eigenvalues and eigenvectors, from which the vibrational modes and frequencies are obtained.

In performing flutter analyses, the results of subsonic nonstationary aerodynamic calculations are used to represent basic flutter characteristics; the most severe flutter conditions occur at low altitude near sonic speed, so they must be corrected for compressibility effects. The system uses the method of subsonic spatial dipole grid points to perform the nonstationary aerodynamic calculations, and has provision for incorporating observed unsteady kernel functions. The flutter equations are solved using the improved QR method to find the complex eigenvalues, then the reduced frequency value corresponding to zero damping is determined, and finally the flutter characteristics are obtained.

In performing static aeroelastic analyses, the wing is divided into several sections, and aerodynamic influence coefficients are calculated using strip theory; the influence coefficients are calculated by substituting the surface dipole strip matrix into the formula. The wing lift distribution and the aerodynamic load can be calculated by solving the static aeroelastic equilibrium equation.

Calculation of Various Response Derivatives

The optimal design of structures is a nonlinear programming process. The optimization requires various constraint derivatives to determine the most effective direction for redesign. In addition, to reduce the number of analyses of the complete structure in the optimization process, it is necessary to use the explicit approximation formulas for the constraint functions as

... of the constraint derivatives. Since most state constraints are
... nonlinear implicit functions of the design variables which are
... to obtain directly, a key issue in the optimal design problems has
... to find an effective method of calculating the constraint derivatives.
... two basic approaches in computing constraint derivatives: numerical
... differentiation and analytical derivatives. The numerical differentiation
... to implement but it requires large amounts of computation,
and is relatively inefficient and inaccurate. Therefore, this system uses the
... method to determine constraint derivatives; it is more efficient
... and has higher accuracy. The constraint derivatives that can
... in this system include: generalized displacement derivatives,
... derivatives, influence coefficient derivatives, derivatives of funda-
mental vibration characteristics, derivatives of flutter speed, efficiency
derivatives, and divergence speed.

... Optimization

... nonlinear mathematical programming technique to perform optimization,
... of stress constraint only a simpler full-stress method of design
... or the results of full-stress design can be used as initial
... mathematical programming procedure to improve computational
... .

... of nonlinear mathematical programming techniques are feasible for solving
... problem of optimal design of complicated structures under multiple con-
... has always been a controversial issue primarily because of its low
computational efficiency. For this reason, the system implemented a series of
... and organized the programs so that marked improvement in compu-
... efficiency was achieved.

The basic technique used in this system is the sequential unconstrained
optimization technique (SUMT), which converts a multiple-constraint optimal
design problem (constrained extremal-value problem) into a sequence of uncon-
strained extremal-value problems by using internal penalty functions. In order
to ensure that the design points may deviate from the admissible region due
to the use of approximate functions and other reasons, and to relax the strict
limitations imposed on the initial points, the penalty function is chosen to be
in the form of a second-order expansion. The solution of the unconstrained
extremal-value problem can be obtained by the gradient method, the conjugate
method, Newton's method, the DFP method, or the BFGS method; the one-dimensional
search problem can be solved by using the method of parabola or the method of
golden division. There are a combination of 10 different methods which can
be selected at the user's option.

Postsolution Processing

During the computation or at the end of computation, the user can issue commands
to have selected results printed in wide-margin tabular form or presented in
graphic form. The graphic outputs include: numbered diagram of the model and
node points, stress distribution plots, displacement plots, plots of variable

26.

data, plots of flutter characteristics, plots of vibration mode lines, plots of load pressure center, plots of parameter variation during iteration (variation of object function and constraint responses) and aerodynamic block diagram.

Program Organization

The system has a level-oriented program structure with independent modules; it uses files and dynamic data blocks for information exchange, and provides re-assigned interfaces. There are four program levels: master control, main programs, modules, and common subroutines. The system has 9 functional main programs, 34 functional modules, and a number of subroutines. The main programs can operate either in series or in parallel, and can exchange information through the data files; the modules can exchange information either through files or through the dynamic common data blocks. The master control level includes several main programs for operational management and data management, language translation and module assembly as well as programs for testing and error control.

The system has 9 operational commands, 17 data generation instructions, 18 flow instructions, 2 instructions for printed output, and 2 instructions for graphic output. The user can assemble the individual modules into main programs by using the flow instructions, then use the operational commands to control the overall operation of the system.

By using multiple main programs, the system can reduce the operation page size, and the computation cycle of each link. The system can also operate in a parallel processing mode, thereby reducing the overall computation cycle. The core of this system is the optimization program; all the other main programs are specially designed to facilitate its operation in computation time and storage.

The modular structure of the system contains a relatively large library of functional modules; new modules can also be added according to needs. The main programs can be assembled by user computation information, user-supplied instructions, or FORTRAN codes. In using the system, sophisticated users can develop their own modules to be incorporated in the module library, so that the system can be continually expanded and improved.

In addition, the system uses a dynamically allocated common block with dynamic protection region. The data in each module are dynamically allocated in this common block; data which require protection are stored in the dynamic protection region. This approach allows full utilization of virtual storage and minimizes the number of accesses to the magnetic disc files so that higher computational efficiency can be achieved.

The structure of the system programs are shown in Fig. 1 and Fig. 2.

Verification of Sample Calculations

In order to test the various functions of the system, 55 sample calculations were performed during its development. The algorithms for different parts of the system were tested for reliability, and the results were compared with those which had been previously verified or with published results. Thus, the validity of the methods was verified from a number of different aspects.

During the stage of component tests, 50 sample calculations covering 110 different configurations were validated; comparisons were also made between the analytical method and the finite difference method in computing derivatives for flutter and static aeroelastic responses, with very good agreement.

During the stage of integrated tests, calculations of two simplified wing models were carried out, and the results were accurate.

In addition, calculations of the vertical tail of a supersonic airplane were also performed to test the system capability in treating complex structures.

This system provides a practical application software for China's design experts to perform optimal design of wing structures under multiple constraints. In the future, it is suggested that the following improvements be made: 1) develop the capability of optimal design using composite materials; 2) incorporate the capability of optimal design of wing structures with suspended objects.

For detailed technical description and procedure of using the system, the reader is referred to the technical reports covering the YIDOYU- model.

Figure 1.   Schematic Block Diagram of System Operation

Key:

1.   User commands, instructions
2.   Master control program
3.   Data generation program
4.   Nonstationery aerodynamics and processing program
5.   Stationary aerodynamics and processing program
6.   Load calculation and processing program
7.   Statics data processing program
8.   Approximation of original problem
9.   Full stress design program
10.   Modules 1, 2,........,32
11.   Optimal design program
12.   Is accuracy requirement satisfied?
13.   Yes
14.   No
15.   Common subroutines
16.   Printed and graphic output program

Figure 2. Schematic Block Diagram of Information Flow

Key:

1. Operating command string
2. Flow instruction string
3. Object programs, modules
4. Object file
5. Master control
6. Source program file
7. Source programs, modules
8. Program flow organization
9. Module flow organization
10. User data instruction string
11. File storage
12. User-developed modules
13. Printed reports and tables
14. Graphs
15. User tapes

DEVELOPMENTS IN TRANSPLANTING ORGANS SUMMARIZED

[Report by Xia Suisheng [1115 4482 3932], Institute of the Transplantation of
Organs, Wuhan Medical College: "New Advances in the Transplantation of Organs
in China"; this article was received on 6 December 1982]

[Text] The transplantation of organs in China has continued to gain many new
achievements since the First Academic Symposium on Organs Transplantation was
convened in Wuhan City, June 1981. (See this Journal 6:647, 1981). A compre-
hensive report is made as follows:

I. The Rising of the Clinical Transplantation of Small Visceral Organs

1. The transplantation of bone marrow. According to reports on the National
Symposium on Bone Marrow and Blood-Forming Hepatic Cells held in May 1982,
nine transplantations of histocompatible typed isogene bone marrow were per-
formed in China, one of them was performed at the Institute of Blood Disease,
Beijing Medical College, postoperative surveillance continued for over 10
months and its permanent vitality was proven.[1,2] The case was that of a male
patient with mononuclear leukemia. In 6-9 months after the operation was done,
a great many analyses on the chromosomes of peripheral blood and bone marrow
were conducted and proved that the chromosome of the acceptor had changed
from 46XX to 46XY; and the acid phosphatase of the patient's red cells was BA
type before but had now changed to B type, the same as the donor's; the blood
group of his red cells also changed from MN before the transplantation to M.
Of the remaining eight cases, three were not permanently vital, one was bone
marrow autorecovered and four died because of antihost diseases and other rea-
sons. In addition, the infusion of blood-forming tissues, such as those of
bone marrow and fetal liver, were applied in over 100 cases and 50 cases,
respectively, and definite clinical curative effects have been gained, espe-
cially in treatment of certain aplastic anemia, the autorecovery of bone
marrow was definitely seen and blood-forming tissues infused can also be vital
for a short period.[3]

2. The transplantation of adrenal gland. The hospital attached to the
Guangxi Medical College performed China's first case of adrenal gland trans-
plant in November 1981. The case was that of a patient with adrenal hyper-
nephroma in both kidneys. After the total excision of the adrenal glands of

... z[...], the adrenal cortex could not function perfectly. They performed a heterotransplantation of the adrenal gland with bases of blood vessels and [...] the vein of the donated adrenal gland with the acceptor's great saphenous vein and the inferior arteries of the donated adrenal gland with the [acceptor]'s lateral arteries of the circumflexible femur. The application of [immuno]suppression was stopped 10 days after the transplantation, postoperating surveillance continued for more than 4 months and the excretory volume of 17-hydroxy corticosteroid and 17-ketosteroid in urine went up successively; the amount of acidophil granulars was increased in counts from time to time and the patient gained weight as well; all these indicated the gradual function of the transplanted adrenal gland.[...]

3. The transplantation of pancreatic islets. On the basis of getting experiences from the pancreatic islet heterotransplantation of large white mice with alloxan diabetes and the culture of human fetus' pancreatic islet tissues, in November 1981, the Shanghai First People's Hospital developed heterotransplantation [of] pancreatic islets in the treatment of 11 cases of patients with insulin-dependent diabetes.[...] The tissues were taken from an induced fetus. After culturing for 2 weeks, those tissues were transplanted in muscles in seven cases, and transplanted in the abdominal cavity in four cases. After operations, patients were infused with antilymphocyte globulin (30mg/kg) by intravenous drip. Three of the 11 cases were under postoperative surveillance for more than 5 months, and satisfactory curative effects were gained. In 10 of the 11 cases, the volume of insulin applied had dropped more than one-third to three-fourths compared with those applied before operations, and patients' conditions were under control, the value of blood sugar when the stomach was empty remained normal and even below normal level, and it was proven that the heterotransplanted pancreatic islets continued to function fairly well.

4. The transplantation of parathyroid glands. The First Hospital attached to Zhongshan Medical College conducted heterotransplantations of parathyroid glands with bases of blood vessels[...] in a total of 14 cases and 15 times. The longest postoperative surveillance lasted 42 months and among the 13 cases which were observed for over 3 months, 12 cases were successful and 1 was not, so that the curative effects were fairly satisfactory. Standards put forward for the successful transplantation by this hospital are: the value of blood calcium should go up to or close to normal; Chrostek's and Trousseau's signs should turn to negative; tetania, abnormal feeling, weakening strength, jactitation, melancholy and mental symptoms should be alleviated or disappear; calcareous medications can be stopped or taken only in small doses with no intravenous injections at all.

5. The transplantation of testis. This kind of program is still on trial. In 1981, the Municipal First People's Hospital of Changzhou and the Huashan Hospital attached to the First Medical College of Shanghai conducted separate testis autotransplantation in patients with testis atrophy and pelviotestis.[6,7] They connected spermatic veins and arteries with epigastric inferior arteries. Postoperative surveillances continued for 8 and 6 months respectively. Sizes of testes became normal, and small amounts of sperm were found in the Changzhou case in semen checks, their activity was fairly good but the fecundity has yet to be proven.

... ... adapted to liver transplantations were, in 49 out of the 55
... , primary liver cancer; the others were congenital biliary atresis, liver
... ... nucleus degeneration and cancermetastasis from gall bladder to liver.
...-three of the 55 cases were liver orthotopic transplantation while the
... ... , heterotopical ones.[14,15] New reports on the transplantations of
... ... cases have not yet been seen, they remain at three and two cases,
... ...

III. Medications for Controlling Rejective Reactions

... ... medications used for controlling acute rejective reactions are sulfa-
... ... rin and adrenaline. To deal with the acute occurrence of rejective
... ... after kidney transplantation, the general tendency is, in comparison
... ... a few years ago, applying smaller doses of hormone as a booster
... ... to reduce complications.[ ] In recent years, the acute rejective re-
... ... urring after liver and kidney transplantations have mostly been
... ... with the combination of the above medications and the antihominothymo-
... ... lobulin. It has been proven to be effective in the alleviation
... ... toms, the reversion of critical phenomena of serious rejection, the
... ... the applied volume of hormone and the reduction of the frequency
... ... as well as delaying of its occurrence.[16] There are also reports
... ... itions of local radiotherapy and thorax conduit drainage after
... ... transplantation.[ ]

V. Experimental Transplantation of Visceral Organs

... ... ings of the creation of an operating model on the experimental trans-
... ... ation of animal organs are shown in two respects: 1) providing experi-
... ... al means for the theoretical study; 2) as simulated operations, they can
... ... foundation for clinical application. In recent years, many countries
... ... extensively adopted the transplantation of small animal organs as the
... ... imental models of basic theoretical study in order to save manpower,
... ... and to conduct a series of experiments. The Institute of the Trans-
... ... ation of Organs, Wuhan Medical College, after the success in the creation
... ... heterotransplantation and the heterotopical heart transplantations
... large white mice, again created liver orthotopical heterotransplantations
... 1982 and has had a preliminary success. Of these mice, 63.6 percent sur-
... ... for a week after the transplantation and one survived for more than 11
... ... ths, the longest period of survival among the mice.[17] The longest period
... ... observation after kidney heterotransplantation of large white mice created
... this institute was 1 year and 4 months, and after heart transplantation,
... ... year and 7 months and both also continued to function well.

... experimental transplantations of animal pancreas have been developed in
Wuhan and Zhengzhou one after another in order to discover a set of operating
methods which can be provided for clinical applications. At present, the dif-
ficulties in pancreas transplantations concern the handling of the pancreatic
ducts and the control of rejective reactions. The Institute of the Transplan-
tation of Organs, Wuhan Medical College, developed the transplantation of
opened segments of pancreatic ducts of dogs, conducting autotransplantation
or homotransplantation with the end of pancreas with bases of spleen veins and
arteries (one-third of the whole pancreas), and it proved to be enough to

... and ... , ... the ... , observations on the normal
... distributions of the arteries and veins of a particular organ,
... have provided useful data for the transplantation of its kind, are very,
... in selection of suitable blood vessels for operation.

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TRAINING OF SENIOR DOCTORS MUST NOT BE NEGLECTED

Beijing PEIMIN RIBAO in Chinese 5 Jul 83 p 3

[Article by Bai Qin [4101 3830]]: "Do Not Neglect the Training of Senior Doctors."]

[Text] At present, many senior and middle-ranked doctors and technicians in key hospitals are seriously advanced in age. Using my hospital as an example, the oldest of the specialists at the professor rank is 85 years of age, and their average age is 70; the average age for associate rank specialists is also 59. This is to say that there are not that many years which they can serve our country's medical services. Therefore, at the same time when we are energetically training junior doctors and technicians, we have to diligently train many senior doctors and technicians so that we can keep abreast of the development of medical enterprises and guarantee the constant elevation of the standard of our country's medicine.

In order to meet the needs of the rural areas, medical schools and colleges will reform the method of admitting students and it is essential that we should strive for the training of relatively more doctors at the college level in a short period of time. Yet, it seems that the urgent task of training senior doctors has not aroused the serious attention of the people in general. My concrete proposal is this: Beginning this year, a number of outstanding students from every graduating class of undergraduates should be selected and placed in key hospitals for further studies; and, counting internship, they will study for 4 more years, i.e., 1 year of internship and 3 years of key training. Taking the number of major key hospitals in the country to be 100 (the number is far greater than this if hospitals affiliated with medical schools are included), if every hospital selects 50 outstanding students each year, the country can train the first 5,000 senior doctors in the years 1983 to 1987. If the figure continues to increase like this every year, we would have trained from 70,000 to 100,000 senior doctors by the end of this century. I believe that it is possible to train a large number of senior doctors using the aforementioned method.

At present, there are some middle-aged and old specialists in every major hospital. They have not only advanced medical skills but are also eager to serve the country and they have a strong sense of responsibility and urgency in training successors.

... facilities, as well as widespread ... ... which will widen the students' horizons and increase their ... ...

... the teachers, the fixing of the course of study ... ... them to arrange the curricula in a planned way ... ... abilities of the students, while emphasizing the guidance toward ... ... tions, or certain special skills, so that capable persons will be trained as quickly as possible.

The urge to imitate among youths is strong. Under the guidance of ... teachers whose morality, habits, and professional skills are excellent, ... foundation for the students can be layed in such things as medical ethics, ... of learning, scientific attitude and style of work and ... ... good experiences, not found in books.

Of course, every hospital at present has the problem of shortage ... ... and beds. If 50 are enrolled each year, there will be 200 in 4 years, and dormitories will be a difficult problem. If we make some calculations, keep a stiff upper lip and gradually reduce the number of graduate students currently being trained in various key hospitals while allowing the number of doctors receiving key training to increase gradually, and, in addition, creating ... ... solve some of the dormitory problems, then the difficulties described above ... be resolved.

I hope that at this time of reform everyone will work together with ... to overcome difficulties and create a new situation and add a new splendor to the work of training high level medical personnel.

FBIS 3002/146

NEW PATHOGENIC GERM DISCOVERED

Shanghai WEN HUI BAO in Chinese 3 May 83 p 1

[Article by Li Jianping [2621 1696 1627]: "Liao Wanqing [1675 5502 3237] Discovers New Pathogenic Germ"]

[Text] A new pathogenic germ was discovered by Liao Wanqing, lecturer and chief medical officer of the Dermatology Department of the Long March Hospital affiliated with the Second Medical College of Military Surgeons. His report, entitled, "New Invisible Coccus Shanghai Mutation Causes Meningitis," given in a national conference of dermatologists has won outstanding critical reviews from specialists in the conference. Everyone considers this to be a gratifying discovery which shows that our country has a new level in fungus research.

Fungi belong to the lower plants and are widespread in the natural world. As many as 120,000 different kinds have been identified and more than 100 of them are pathogenic germs. After graduating from college in 1962, Liao Wanqing has been taking care of patients in the Dermatology Department and often encountered some deep-seated fungus diseases that are hard to cure. Therefore, he directed the thrust of his scientific research on deep-seated fungus and conditional pathogenic germs. In the past few years, he has done a lot of sophisticated research work and discovered successively the pathogenic germs of polished coccus like saccharomycete and Chaoluokebaojun [1560 5453 8199 132A 4624], creating conditions for the clinical treatment of deep-seated fungus diseases.

In 1980, he isolated a kind of germ from the cerebrospinal fluid of a meningitis patient. Through animal experiments and microscopic observations, he believed that it might be a new kind of germ. At the request of Liao Wanqing, the Institute of Dermatological Diseases Research of the Chinese Academy of Medical Sciences and the Department of Microorganism Research of Fudan University conducted an evaluation and the result was identical to that of Liao Wanqing's experiment. According to international regulations for giving names, the new germ was named the New Invisible Coccus Shanghai Mutation.

After the completion of the evaluation of techniques, Liao Wanqing again engaged himself in the preparatory work of evaluating the result. France has published a report on a new invisible coccus gattii mutation. He read a lot of materials and finally found the report on the gattii mutation. He compared the documentary report with his discovery and found that they are markedly

different. The hospital brought him the ...tii mutation from Belgium and the 85_5 mutation from the United States. Liao Wanqing, the Institute of Dermatological Diseases Research of the Chinese Academy of Medical Sciences, and the Department of Microorganism Research of Fudan University carried out successively a great deal of observation and experimentation. The result shows that the newly discovered germ, besides being different from those introduced from other countries, also possesses the characteristics of self-dissolving and strong pathogenic capabilities, and is a new pathogenic germ first seen in our country.

17360
CSO: 4008/146

BRIEFS

CHROMOSOME RESEARCH--The topics for chromosome research on hereditary diseases completed by the Shenyang Family Planning Research Institute and the Biology Department of Liaoning University have been evaluated by China's specialists and professors concerned and have been determined to have reached the advanced level of our country, filling in a blank in our province's scientific research work in family planning. The successful completion of the topics for chromosome research on hereditary diseases has tremendous practical significance for the prevention of the birth of babies with hereditary deformities, the improvement of the population's health, and the strengthening of the prevention of chromosome hereditary diseases. Ever since 1980, the Shenyang Family Planning Research Institute and the Biology Department of Liaoning University have respectively set up the G.C. visible tape, the method of the S.C.E. experiment, the method of examining sex chromosome, the method of determining the quantity of protein in the amniotic fluid of the embryonic shell and the method of culture amniotic fluid cells, and applied them to clinical practices. They have conducted 716 cases of advisory outpatient services and cell genetic examination was carried out on outer layer blood in 537 of the cases, thereby establishing firmly the test method and gradually elevating the level of diagnosis, and effectively guaranteeing the quality of advice on hereditary matters--the outpatient work before delivery. Establishment of the method of experimenting in chromosome technology provides the scientific basis for chromosome research on hereditary diseases and the diagnosis of chromosome diseases. [Text] [Shenyang LIAONING RIBAO in Chinese 23 Jun 83 p 3] 12380

CSO: 4008/146

Author   ZHOU Faqi [5719 6599 .677,

WANG Guangyi 3769 1664 5035,

ORG   None

TITLE   "Synthesis of Some Aromatic Trinitro Compounds"

SOURCE   Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3 198.
pp . 15

TEXT OF ENGLISH ABSTRACT   In this paper the synthesis of nine new aromatic
trinitromethyl compounds is reported   namely that of para-chloro-meta-nitro
parabromo-meta-nitro, para-methoxy-meta-nitro , 4-methoxy 3 5 dinitro
4-amino-3, 5 dinitro, 4-dimethylamino-3, 5-dinitro , 4-methyl-nitro and
3, 5 dinitro phenyl trinitromethane, 1, 3-bis(trinitromethyl) benz and
.nitro-1, 3-bis(trinitromethyl) benzene.

In addition, synthesis of four more new aromatic dinitromethyl   is
also reported   namely that of para-chloro-meta-nitrophenyl
dimethylnitramino 3 5-dinitro phenyl-dinitro-methane, 1, 3 bis
benzene and 5 nitro-1 3-bis(dinitromethyl) benzene

Author   MEI Fengxiang [2734 7364 5046]

ORG   None

TITLE   "Generalized Nielsen's Equations for Nonholonomic Mechanical Sy   .
with Variable Mass"

SOURCE   Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 3 198.
pp .. 19

TEXT OF ENGLISH ABSTRACT.   In this paper, the Jourdain's principle and it
Nielsen's forms for the mechanical systems with variable mass are given
then various forms of generalized Nielsen's equations for nonholonomic mechanical
system with variable mass are obtained   Finally an example .. .iv

AUTHOR   WANG Qianyu [3769 6337 2589]

UNIT   Beijing

TITLE   "Viscoelastic Analysis of Stresses and Strains in Solid Propellant Under Pressure Loadings"

TEXT OF ENGLISH ABSTRACT: This paper is devoted to the viscoelastic analysis of stresses and strains resulting from pressure loadings. Some engineering methods for solving this classical problem have been developed. For example, formulas were derived on the assumption that propellants are incompressible or motor case are undeformed, and some other formulas are derived without these assumptions with Schapery's approximate inversions used to obtain viscoelastic solutions. In this paper, a new method is developed without using the above assumptions and approximate inversions. Therefore, the stress and strain solutions are more accurate than those derived from the above methods.

The solutions of these two planar problems result from suddenly-applied pressure and gradually-applied pressure.

AUTHOR   XIAN Mengwei [0029 1125 2734]

UNIT   Beijing

TITLE   "The Relationship Between Adiabatic Shear and Ballistic Properties in Al Alloy Targets"

TEXT OF ENGLISH ABSTRACT: The crater analysis for Al-alloy targets of different ballistic properties by metallography is presented in this paper. It is found that the ballistic property of the target is concerned with the adiabatic shear. Dynamic stress-strain curves of two kinds of Al-alloys are determined with a strain rate of 100 per second ($\dot{\varepsilon} = 10^2/s$) by a one-dimensional Split Hopkinson Bar. The effect of dynamic behavior on the adiabatic shear and ballistic properties is analyzed and compared with critical conditions of strain and strain rate, where yield stresses of two alloys are used.

Author   ZHAO Songxia [6392 9129 3476]

ORG   None

TITLE   "A Study of the Low Frequency Instability of the Solid Propellant
Rocket Engine"

TEXT OF ENGLISH ABSTRACT: This paper presents a new concept of the low
frequency /* instability based on experiments and analysis of the flowing
field of combustion gases in the engine. It shows the relationship between
tube grain design parameters (ratio of inside-port to outside-port parameter
and chamber pressure p) and its effect on the low frequency instability. A
method for analyzing the low frequency instability of the tube grain engine
is derived through theoretical study. The theoretical analysis coincides with
the experimental results. This paper will be useful in determining tube grain
design parameters (p and z) and their effect on the damping of the low frequency
instability.

Author   CHEN Hongzhang [7115 3163 4545]
          JIA Qinzying [6328 1967 5391]

ORG   None

TITLE   "Ignition and Initial Peak Pressure of Small Solid Propellant Rocket
Motors"

TEXT OF ENGLISH ABSTRACT: This paper studies the cause of the initial peak
pressure of small solid propellant rocket motors formed at high temperatures,
proposes a specific method for predicting the initial peak pressure and
discusses the specific measures for reducing or eliminating the ignition peak
pressure at high temperatures. These studies are of practical importance to
further improvements in the design of solid rocket motors and their comprehen-
sive performances.

Author   Zhao Qihuang [0719 0796 3552]

[Text] ENGLISH ABSTRACT This paper deals with the application of modern
control theory to tank gun stabilizers in consideration of the existing
conditions of tanks. Explorations into finding out the cost function and
computation of the minimal error control and minimal time control have been
made in this paper. The possible improvements of stabilizer properties are
discussed.

AUTHOR: ZHANG Hui-in [1728 1920 3056]
         LI Keliang [2621 0344 0061]
         GUO Zhizin [6753 1807 2450]

ORG: All of Tianjin Municipal Research Institute of Labor and Health

TITLE: "A Modified Apparatus To Measure Nerve Conduction Velocity"

ABSTRACT: Determination of nerve conduction velocity is often necessary for clinically differentiating myogenic from neurogenic diseases or for studying the effect of a given toxin, drug, or organ on the function of nerve conduction. There is yet no device made in China suitable for measuring nerve conduction velocity. The electromyographic instruments available on foreign market all belong to the stimulation type but can't be used to compare induced potential waveforms at two or more locations. This paper reports an apparatus designed and made by the authors, using a double stimulation process to determine the conduction speed of the motor nerve trunk quickly by calculating the difference between two incubation periods. The work process, the circuit theory, and the major technical indices of the apparatus are described.

AUTHOR: LI Yixin [2621 4135 2450]
         ... zhong [2455 0336 0022]

ORG: Both of Radiology Research Institute, Academy of Military Medicine,
Beijing

TITLE: "A New Assay for Superoxide Dismutase (SOD) Activity: Chemiluminescence Method"

ABSTRACT: In the presence of oxygen, the catalytic base of xanthopterin oxidase (XO), xanthopterin or hypoxanthopterin (X or HX), will excite luminol to cause it to be luminescent when it returns to the base state. As SOD can eliminate O_2^-, it can prevent luminol from becoming luminescent under the above conditions. On the basis of this theory, a test is designed to determine SOD activity, more sensitive than other methods of testing. The Massey method is adopted to extract XO from milk; HX and luminol are imported from England; the Cu,Zn-SOD is a freeze-dried powder extracted from bovine blood by the authors. When a special luminescence measuring instrument, such as a liquid scintillation counter, is used, this method may detect a content of $10^{-11} - 10^{-7}$ M (SOD). Details of the experiment are reported and discussed.

AUTHOR: CHENG Biji [4453 0130 1015]

ORG: None

TITLE: "Symposium on Biophysics Education Work"

ABSTRACT: A nationwide higher education biophysics education work symposium, sponsored by China Society of Biophysics Education Work Committee, was held in Beijing on 21-23 January 1983 and attended by more than 50 delegates representing various colleges, the departments of higher education, and the People's Education Publishing House, etc. The purpose of the symposium was to exchange domestic and foreign experience in biophysics education and the training of a teaching staff. At present, different areas of biophysics are emphasized in these colleges, depending mostly on the qualification of the teachers. In some colleges, there may be a department of biophysics and a department of molecular biophysics; in others it may be incorporated in such departments as physiology, biochemistry or radiation biology. In still others, the subject is a graduate research specialty, supervised by a group of teachers of various departments. Among the major problems discussed at the symposium, the first was the difficulty of obtaining job assignments for graduates of such a specialty

[continuation of SHENGWUHUAXUE YU SHENGWUWULI JINZHAN No 3, Jun 83 p 68]

in biophysics. The second is the difficulty of designing the course. It was resolved that a series of lectures on biophysics should be organized for the coming summer by the Ministry of Education, with lecturers recommended by the society.

ABSTRACT: The [illegible] [illegible] [illegible] by the National Science Committee [illegible] completed [illegible] [illegible] [illegible] the Institute of Applied [illegible] Sciences [illegible], [illegible] Institute of Medicine, [illegible] Provincial Research Institute [illegible], [illegible] [illegible], Sichuan Provincial [illegible] Company, et al. [illegible] [illegible] [illegible] [illegible] are vacuum packed in plastic wrapper, and less than [illegible] [illegible] [illegible] [illegible] 3500-6. According to the opinion [illegible] [illegible] [illegible] [illegible] pork, thus treated, is very [illegible] [illegible] even after [illegible] [illegible] [illegible] [illegible] room temperature. The specifications [illegible] [illegible] [illegible] [illegible], the nutritional and sanitation evidence [illegible] [illegible] [illegible] [illegible] [illegible] keeping the pork, and the economic benefit [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] described in the paper.

AUTHORS: [illegible] Huamin [7139 1920 3046]
         WANG Xiurong [3769 4423 2503]
         LIU Fengjuan [0491 0948 1739]
         SHI Meide [0670 5019 1795]
         NIU Zongfen [0491 1550 3552]
         LEI Zaixi [7191 1807 2084]
         WANG Jinzhu [3769 0093 551]

ORG: All of Institute of Biophysics, Chinese Academy of Sciences, Beijing

TITLE: "Processing Information on Moving Objects by Computer"

ABSTRACT: The capability of using a computer to interpret images, captured [illegible] [illegible] at three frames depicting a frog picking fruits has been [illegible] [illegible] [illegible] a foreign country [Japan]. This paper reports the attempt by the authors [illegible] to let a motion picture composed of five frames to be processed by computer. In order for the project to be successful, the authors believe the computer must be able to recognize the moving objects and their positions, distinguish [illegible] [illegible] [illegible] at rest, and report the appearance of the object [illegible]. A program is written to simulate such an information processing design [illegible] [illegible] on a [ROMEMCO] microcomputer. This paper was delivered at the [illegible] National [illegible] on Artificial Intelligence in September 1981 and revised for publication in the journal.

This paper was received for publication on 7 July 1982.

A[...]: [...]

[...]: [...]

[...] "[...] Enzymes for Genetic Engineering Produced and Supplied by the
Institute of Biophysics

ABSTRACT: A Biochemical reagent conference was called by the Division of
Biology, Chinese Academy of Sciences, in Beijing on 23-26 March 1983 to examine
[...] tion of tool [1562 0367] enzymes for genetic engineering and to make
arrangements for research and production of tool enzymes in 1983-85. The bio-
[...] unit of the Institute of Biophysics is in charge of the research and
production work. It has formally informed all research units of the country
that it is ready to supply them with DNA polymerase, polynucleotide kinase,
[...]RNA polymerase, polynucleotide phosphatase, DNA ligase, RNA ligase, RNA poly-
merase, Nuclease 1, Ribonuclease TI, DNAase II, λ-DNA, pBR322, EcoRI,
BalII, [...], alkaline phosphate esterase, and alkaline phosphate diesterase.
[...], the plant also supplies hexose kinase, creatine kinase, alcohol dehy-
drogenase, glucose-6-phosphate dehydrogenase, malic acid dehydrogenase, lysozyme,
[...]cis citrate, etc. The quality of the above items and their availability are
guaranteed.

Following an introduction to the importance of ...

Institute of Automation, Chinese Academy of Sciences

"Management of Information Systems and Advisory Decision Made"

... of several thousand workers uses nearly 100 computers ... Using a modernization of management has produced benefits in departments of textile, automobile factories, steel and iron mills, textile mills, etc. ... while, there are very few industries using computers for management. It ... matter of time before computers are extensively used, however, because in the process of economic reform, economic benefits are being emphasized ... and more to create the condition for industries to use computers for economic management in order to realize modernization. The paper also briefly describes the process of using computers instead of holding meetings of branch ... gather freight data in 2 days instead of 20 days to demonstrate the feasibility of using computers in industrial management and decision making.

Author: of Xiamen Institute,

OK : No. a

TITLE: "First Conference on Electric Light Source Standardization Held in Xiamen"

ABSTRACT: The first Electric Light Source Standardization Conference, sponsored jointly by the China Standardization Association and Beijing Institute of Electric Light Source, was held 22-27 March 1983 in Xiamen, Fujian Province. Representatives of Illumination companies, lamp plants, and related research institutes in Beijing, Tianjin, Shanghai, Shenyang, and Guangzhou, and some specialists from ... colleges and universities were present. Economic results of standardization of electric light source and future work were among the topics that were discussed from theoretical as well as practical viewpoints in the reports ... ized by the conference. According to preliminary statistics, if the energy efficient high-pressure sodium lamps are used to substitute for the high... consumption fluorescent high-pressure mercury lamps, 400,000 kw of electric power consumption per year, the equivalent of the product of one source

... tion of BIAOZHUNHUA TONGXUN No 6, 1983 p 15]

... ent. A shortcoming of sodium lamps is poor color differentiation, which is being studied by related organizations and some results have been obtained. Problems relating to the adoption of international standards in the electric light source industry were also discussed at the conference.

Organic Chemistry

Author: ZHONG Zimao [6988 1800 2021]
        CHEN Chaoxuan [7115 2600 3883]

Org: Both of Shanghai Institute of Organic Chemistry, Chinese Academy of
   Sciences.

TITLE: "13C-(19F) NMR Decoupling Method"

ABSTRACT: Since the introduction of the FT nuclear magnetic resonator, the
coupling constant of 13C-19F and the chemical displacement of 13C may be
directly determined, but for many polyfluorine compounds containing many types
of non-proton fluorine, the spectral lines of the 13C spectrum are complex and
mutually overlapping. If the fluorine-carbon coupling is not removed, it is
relatively difficult to distinguish the property of the lines and their cor-
responding coupling constants. To date there has been no report of a 13C-(19F)
NMR decoupling experiment. Due to the relatively great range (300ppm) of dis-
placement of 19F and because the value of Jc-F is greater than that of Jc-H,
decoupling is generally difficult. A 19F noise decoupling experiment requires
greater irradiation power, thus it is especially difficult. The authors used

the Varian XL-200 superconduction nuclear magnetic resonator to carry out the
experiment, including both the noise decoupling and selective decoupling methods.
The coupling constant of many fluorine-containing compounds was measured and
satisfactory results were obtained.

Authors: XING W....... [1672/0968 2/33
         LI Huali [.... 1920/7812]

Re: Both of Lanzhou Institute of Modern Chemistry

TITLE: "Constant Potential Meter for Electrical Organic Chemical Research"

ABSTRACT: A constant potential meter is indispensable in ... ...
.... The available domestic constant potential meter ... ...
...venient to use, however, because of the difficulty in ....
and response. The author used related foreign literature ....
made one with relatively better properties. Preliminary ....
......roved it to be satisfactory for routine electrolytic ....
.... electrical chemical work. The purity and ....
.... are both acceptable. All components are ....
... ... installed on one piece of printed circuit board. ... ...
... ... very low input and can be assembled by the user. ... ...
... . The ... ... theory, the circuit analysis, and ... ...
... ... in the paper.

Transportation

Author: None

Unit: Carburetor Group, Tianjin Internal Combustion Engine Research Institute

Title: "Conference To Establish Small Gasoline Carburetor Industry Group Held in Kunming"

Source: Tianjin XIAOXING NEIRANJI [SMALL SIZE INTERNAL COMBUSTION ENGINES] in Chinese No 2, 1983 p 23

ABSTRACT: For the purpose of exchanging technical information and developing interindustry competition and criticism work, the conference to establish the Machine-Building Industry Ministry Small Gasoline Carburetor Group was held in Kunming, Yunnan Province, on 10-15 December 1983 and attended by 43 delegates of 13 units. The two documents concerning the technical conditions and quality inspection methods of small gasoline carburetor proposed by the Tianjin Internal Combustion Engine Research Institute and approved by the ministry were carefully discussed and the "Industrial Standard for Determining the Cleanliness of Small Gasoline Engine Carburetors" was formulated for trial implementation within the industry. The delegates agreed that the conference was very instructive and they learned many methods for strengtheing industrial management and improving product quality. The direction for developing production technologies of the industry has thus been further clarified.

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